

REMARKS

Claims 1-6 are pending. Claim 1 is amended herein. New claims 4-6 have been added herein. Support for the amendments is found at least at page 3, lines 7-13 detailed below. Support for the new claims is found at least at page 8, line 5 to page 13, Table 3 of the specification.

Applicants' Response to the Objection to the Specification

The Office Action notes that the Preliminary Amendment to the specification refers to paragraph [0020] as being located on page 3 of the specification. Applicants have corrected this typographical error to recite page 6 as noted above.

Further, the amendments to the specification filed on August 14, 2008 are objected to on the basis that they introduce new matter. Specifically, the Office Action asserts that the changes to the nitrogen percentages are not supported by the original disclosure. In response to this objection, applicants respectfully submit that there is sufficient basis within the specification whereby one of skill in the art would discern that the nitrogen percentages listed are an error.

Paragraph [0020] and the cited examples of N content in table 1 paragraph [0031] are sufficient evidence that the nitrogen percentages are in error. Specifically, paragraph [0020] states that the limited range of nitrogen is 0.002 to 0.1 wt%. Further, the N wt% of examples 1-5 in Table 1 are all 0.012 or lower. As such, one of skill in the art would readily discern that the recited preferable range in paragraph [0020] should read --0.005--. Further, one of skill in the art

would readily discern that the nitrogen percentages in paragraphs [0032] and [0033] are likewise errors based on Table 1. Wherefore, applicants respectfully request favorable reconsideration.

Applicants' Response to the Claim Objections

Claim 1 is object to because in the last two lines, Cr is listed twice. In response thereto, applicants have deleted the repeated listing herein.

Applicants' Response to the Claim Rejections under 35 U.S.C. §103(e)

Claims 1-3 are rejected under 35 U.S.C. §103(a) as being unpatentable over Sagawa et al. (EP 0 106 948).

As noted above, amended claim 1 recites that feature that the magnet material comprises a R-O-F compound which is localized at triple points in the magnet.

Applicants respectfully submit that the presently claimed invention is not obvious over Sagawa for at least the reasons that all the aspects of the claims are not disclosed either specifically or inherently by the reference, and one of skill in the art would not be able to discern the present invention based on the teachings of Sagawa.

In the present specification, the specific amount of fluorine added to a R-Fe-B base permanent magnet forms a R-O-F compound which is localized at triple points in the magnet; and that the R-O-F compound, when finely dispersed in the magnet, is effective for restraining primary phase grains from abnormally growing during the sintering process of the R-Fe-B

permanent magnet materials, thereby increasing the coercive force of the R-Fe-B permanent magnet material.

Sagawa teaches a Fe-Co-B-R base magnetic material which may include additional elements M. M may include Al, Cu, as well as Hf and other possible components of "M" in applicants' claim 1. See pages 6-7 of Sagawa. In regard to C and O, the Office Action points to the disclosures on pages 19-20 of Sagawa which teach allowable limits for impurities in atomic percentages and in regard to N and F, the Office Action notes Sagawa teaches that these elements may be present as impurities. Applicants note that the Examples of Sagawa do not describe fluorine and nitrogen atoms at all, nor is there any disclosure in Sagawa beyond the mentioning of unwanted impurities.

On the whole, Sagawa teaches that the components C, O, N and F are impurities, and their presence in the final permanent magnet material is not desired, let alone required. Sagawa fails to provide any reason whereby one of skill in the art would discern that a R-Fe-B permanent magnet has a R-O-F compound according to the present invention. Nor is there any other teaching within Sagawa which provides a reason for a skilled artisan to adjust an amount of F, beyond minimizing the amount of impurities, to obtain any desired result or effect. Applicants' specification teaches the opposite.

Applicants' disclosure, particularly for F, clearly demonstrates results which are not expected from Sagawa. Namely, applicants' specification teaches that the presence of these elements contribute to the benefit of the invention.

Under U.S. patent law, applicants can rebut a rejection under 35 U.S.C. §103(a) by showing the criticality of the claimed range. The applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). The evidence relied upon should establish “that the differences in results are in fact unexpected and unobvious and of both statistical and practical significance.” *Ex parte Gelles*, 22 USPQ2d 1318, 1319 (Bd. Pat. App. & Inter. 1992).

Applicants’ specification establishes that the range is critical and the results are unexpected. First, as recited in paragraph [0006] of the specification, the invention requires an appropriate amount of fluorine added to a R-Fe-B base permanent magnet in order to form a R-O-F compound (wherein R is one or more of Nd, Pr, Dy, Tb and Ho, O is oxygen, and F is fluorine). This compound is localized at triple points in the magnet and when finely dispersed in the magnet, is effective for restraining primary phase grains from abnormally growing during the sintering process of the R-Fe-B permanent magnet materials, thereby increasing the coercive force of the R-Fe-B permanent magnet material.

Direct evidence of the unexpected results is set forth in the specification by the comparison of Figs. 1 to Fig. 2, and in the examples to comparative examples of Tables 1-3. In Fig. 1, the magnet, having the critical range of F, had an average grain size of 6.28 μm and a sharp grain size distribution. See paragraph [0032]. Contrary, in Fig. 2, there is no F added and the magnet had an average grain size of 9.47 μm , indicating abnormally grown grains with a diameter of more than 20 μm . Further, Fig. 2 is based on Comparative Example 4 which

discloses that impurity amounts of F are present in the starting raw materials of Nd metal (fluorine contents: less than 0.005 wt%) and Dy metal (fluorine contents: less than 0.005 wt%). See paragraph [0033], page 10, lines 15-17. Hence, applicants' specification clearly indicates that impurity amounts of F may be present, but they are insufficient if they are less than 0.001 wt.%.

Further, the upper limit of the claimed range of F is also critical as demonstrated by Examples 7-14 and Comparative Examples 5-7 and 9-10 set forth in Tables 2 and 3. Specifically, marked degradation of plating occurred when the amount of F added was equal to or more than 2.6 wt.%. See paragraph [0034], page 11, lines 29-31. Further, when the amount of fluorine added exceeded 4.1 wt%, the coercive force decreased beyond that of the fluorine-free sample. See paragraph [0037], page 13, lines 7-9.

As noted above, Sagawa does not disclose that a component range for F is critical, Sagawa only notes that impurity amounts of F may be present, and at least inherently implies that F should be avoided as an unwanted impurity. Whereas, applicants have found that a limited range of F present in the permanent magnet material is effective for restraining primary phase grains from abnormally growing during the sintering process of the R-Fe-B permanent magnet materials, thereby increasing the coercive force of the R-Fe-B permanent magnet material. Hence, applicants have established unexpected results as required by U.S. patent law.

Wherefore, there is no basis for one of skill in the art to construe Sagawa so as to obtain the presently claimed invention. As such, the present invention is not obvious in light of Sagawa.

Claims 1-3 are rejected under 35 U.S.C. §103(a) as being unpatentable over Yamamoto et al. (US 6,296,720) in view of Satoru (JP Pat. Doc. No. P3009687).

The Office asserts that Yamamoto teaches a rare earth-transition metal-boron alloy composition that with the exception of fluorine overlap to the alloy composition recited in each of applicants' claims, citing to column 2, lines 1 to 16 of Yamamoto. For the F feature of applicants' claims the Office Action cites to the English abstract of Satoru as teaching that "adding fluorine to a rare earth-transition metal-boron alloy improves the corrosion resistance of the rare earth-transition metal-boron alloy." Therefore, the Examiner concludes that one of skill in the art would have been motivated by the teaching of Satoru to add F to the rare earth-transition metal-boron alloy composition of Yamamoto to improve corrosion resistance.

First, applicants respectfully traverse the rejection at least on the basis that Satoru does not supply any motivation for adding only F to other alloy compositions, such as Yamamoto to improve corrosion resistance. Specifically, Satoru does not teach adding F will generally improve a rare earth-transition metal-boron alloy composition. Rather, Satoru discloses that a specific formulation of a sintered permanent magnet material, which includes a halogen, has improved corrosion resistance. This teaching is not a broad assertion that F or halogens generally improve corrosion resistance. As such, there is no reason for one of skill in the art to add only F or any halogen to the compound of Yamamoto on the basis that it will improve the material.

Satoru discloses a sintered permanent magnet material having a high corrosion resistant by incorporating 6 to 9% B, 0.01 to 0.5% Cu, 0.1 to 2% Al, and 0.01 to 1.0% x (F, Cl, Br or I).

Yamamoto discloses a sintered, magnetically anisotropic permanent magnet of a rare earth/iron/boron-based permanent magnet alloy composition without fluorine atoms.

One of skill in the art would readily ascertain that different alloys exhibit different characteristics based on their specific compositions. One of skill in the art would not assume or deduce from the teachings of Saturo that halogens are always beneficial to a rare earth-transition metal-boron alloy composition. Wherefore, one of skill in the art does not have a reason to combine Yamamoto with Saturo to derive the currently claimed invention.

Second, the cited references do not disclose the formation of R-O-F compound and the feature due to the formation of R-O-F compound as recited by amended claim 1. Nor is there any reason based on the teachings of Yamamoto and Satoru whereby one of skill in the art would discern that an R-O-F compound should be formed and utilized. Specifically, there is no disclosure that an R-O-F compound is effective for restraining primary phase grains from abnormally growing during a sintering process of a R-Fe-B permanent magnet materials, thereby increasing the coercive force of the R-Fe-B permanent magnet material. There is no disclosure in any of the cited references which disclose this aspect of the invention or any other reason to form the R-O-F compound.

As noted above in response to the rejection based on Sagawara, the claimed range including F can impart the selective, excellent effects on coercive force and squareness, as is proved by Examples and Comparative Examples. Thus, the amount of fluorine is not an inevitable amount but an intentional amount. Therefore, even if Yamamoto and Satoru are

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combined, the feature of the present invention that the R-O-F compound is formed and finely dispersed in the magnet is not present.

Wherefore, applicants respectfully submit that there is no reason for one of skill in the art to derive the currently claimed invention and therefore the presently claimed invention is not obvious.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP

A handwritten signature in black ink, appearing to read "Michael J. Caridi", with a stylized flourish at the end.

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